

PATENT COOPERATION TREATY
PCT
INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY
(Chapter II of the Patent Cooperation Treaty)
(PCT Article 36 and Rule 70)

Applicant's or agent's file reference 36935WOP00	FOR FURTHER ACTION		See Form PCT/IPEA/416
International application No. PCT/AU2004/000922	International filing date (<i>day/month/year</i>) 8 July 2004	Priority date (<i>day/month/year</i>) 8 July 2003	
International Patent Classification (IPC) or national classification and IPC Int. Cl. ⁷ B01D 71/82, 71/38, 71/34, 71/26, 71/32			
Applicant U.S. FILTER WASTEWATER GROUP, INC. et al			

1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.
2. This REPORT consists of a total of 3 sheets, including this cover sheet.
3. This report is also accompanied by ANNEXES, comprising:
 - a. ☒ (sent to the applicant and to the International Bureau) a total of 5 sheets, as follows:
 - ☒ sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).
 - ☐ sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.
 - b. ☐ (sent to the International Bureau only) a total of (indicate type and number of electronic carrier(s)) , containing a sequence listing and/or table related thereto, in computer readable form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).

4. This report contains indications relating to the following items:

<input checked="" type="checkbox"/>	Box No. I	Basis of the report
<input type="checkbox"/>	Box No. II	Priority
<input type="checkbox"/>	Box No. III	Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
<input type="checkbox"/>	Box No. IV	Lack of unity of invention
<input checked="" type="checkbox"/>	Box No. V	Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
<input type="checkbox"/>	Box No. VI	Certain documents cited
<input type="checkbox"/>	Box No. VII	Certain defects in the international application
<input type="checkbox"/>	Box No. VIII	Certain observations on the international application

Date of submission of the demand 5 May 2005	Date of completion of the report 6 July 2005
Name and mailing address of the IPEA/AU AUSTRALIAN PATENT OFFICE PO BOX 200, WODEN ACT 2606, AUSTRALIA E-mail address: pct@ipaustalia.gov.au Facsimile No. (02) 6285 3929	Authorized Officer MATTHEW FRANCIS Telephone No. (02) 6283 2424

Box No. I **Basis of the report**

1. With regard to the language, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.

☐ This report is based on translations from the original language into the following language which is the language of a translation furnished for the purposes of:

☐ international search (under Rules 12.3 and 23.1 (b))

☐ publication of the international application (under Rule 12.4)

☐ international preliminary examination (under Rules 55.2 and/or 55.3)

2. With regard to the elements of the international application, this report is based on (*replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report*):

☐ the international application as originally filed/furnished

☒ the description:

pages 1-23 as originally filed/furnished

pages* received by this Authority on with the letter of

pages* received by this Authority on with the letter of

☒ the claims:

pages 24, 25 as originally filed/furnished

pages* as amended (together with any statement) under Article 19

pages* 26-30 received by this Authority on 5 May 2005 with the letter of 5 May 2005

pages* received by this Authority on with the letter of

☒ the drawings:

pages 1-5 as originally filed/furnished

pages* received by this Authority on with the letter of

pages* received by this Authority on with the letter of

☐ a sequence listing and/or any related table(s) - see Supplemental Box Relating to Sequence Listing.

3. ☐ The amendments have resulted in the cancellation of:

☐ the description, pages

☐ the claims, Nos.

☐ the drawings, sheets/figs

☐ the sequence listing (*specify*):

☐ any table(s) related to the sequence listing (*specify*):

4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).

☐ the description, pages

☐ the claims, Nos.

☐ the drawings, sheets/figs

☐ the sequence listing (*specify*):

☐ any table(s) related to the sequence listing (*specify*):

* If item 4 applies, some or all of those sheets may be marked "superseded."

Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**1. Statement**

Novelty (N)	Claims 1-63	YES
	Claims	NO
Inventive step (IS)	Claims 1-63	YES
	Claims	NO
Industrial applicability (IA)	Claims 1-63	YES
	Claims	NO

2. Citations and explanations (Rule 70.7)

D1: EP 229019

D2: WO 1996/014913

NOVELTY (N), INVENTIVE STEP (IS)

Claims 1-63: None of the cited art discloses or suggests the invention as presently claimed. In particular, there is no disclosure of the use of PVME nor of vinylmethyl ether monomers in the prior art. Hence the claimed invention is considered both novel and inventive.

at least partially water soluble polymeric hydrophilising agent, which contains vinylmethyl ether monomers.

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22. A method according to claim 21 wherein the at least partially water soluble polymeric hydrophilising agent is soluble in an amount of at least 5-10g/l at standard temperature and pressure.
23. A method according to claim any one of claims 21 or 22 wherein the polymeric hydrophilising agent is polyvinylmethyl ether (PVME).
24. A method according to any one of claims 21-23 wherein the polymeric hydrophilising agent is a copolymer containing vinylmethyl ether monomer and at least one other co-monomer.
25. A method according to claim 24 wherein the vinylmethyl ether monomer is present in an amount of at least 50 mole% of the polymeric hydrophilising agent.
26. A method according to claim 24 or claim 25 wherein the co-monomer is selected from the group consisting of: co-polymerisable acrylate monomers and co-polymerisable vinyl monomers.
27. A method according to claim 26 wherein the co-monomer is selected from the group consisting of: vinyl acetate, acrylic acid, methyl acrylate, methyl methacrylate, allyl methacrylate, ethyl acrylate, ethyl methacrylate, methacrylic acid, fumaric acid, monoesters of fumaric acid, diesters of fumaric acid, maleic acid, monoesters of maleic acid, diesters maleic acid, diallyl maleate maleic anhydride, esters of adipic acid (divinyl adipate), ethylenically unsaturated carboxamides (acrylamide), ethylenically unsaturated carbo-nitriles (acrylonitrile), ethylenically unsaturated sulfonic acids (vinylsulfonic acid).
28. A method of modifying the hydrophobic/hydrophilic balance of a polymer membrane prepared from a polymeric material, said method including the step of

contacting said polymeric material with polyvinylmethyl ether (PVME) to produce a modified polymeric membrane.

29. A method according to claim 28 wherein the polymeric membrane is coated with PVME.

5 30. A method according to claim 28 or 29 wherein the polymeric membrane is an ultrafiltration membrane or a microfiltration membrane

31. A method according to any one of claims 28-30 wherein the polymeric material is a hydrophobic polymer and hydrophobic/hydrophilic balance of the polymer is modified to provide a hydrophilic modified polymeric membrane.

10 32. A method according to any one of claims 28 to 31 wherein the polymeric material is poly(vinylidene fluoride) (PVDF), poly(ethylene-chlorotrifluoroethylene) (Halar) and poly(propylene) (PP) or mixtures thereof.

33. A method according to claim 32 wherein the polymeric material is poly(vinylidene fluoride) (PVDF) or poly(ethylene-chlorotrifluoroethylene) (Halar).

15 34. A method according to any one of claims 28 to 33 wherein the polymeric material is a formed membrane treated with a solution of PVME at a concentration and for a time sufficient to allow PVME saturation of said membrane to take place.

35. A method according to claim 34 wherein the polymeric material is post treated by soaking in a solution of PVME in ethanol.

20 36. A method according to claim 34 wherein the polymeric material is post treated by soaking in a solution of PVME in water.

37. A method according to any one of claims 28 to 36 wherein the concentration of PVME is less than 10%.

25 38. A method according to claim 37 wherein the concentration of PVME is less than 5%.

39. A method according to claim 38 wherein the concentration of PVME is less than the concentration of PVME is less than 3%.
40. A method according to claim 39 wherein the concentration of PVME is greater than 0.1%.
- 5 41. A method according to any one of claims 28-36 wherein the concentration of PVME is 1 to 5%.
42. A method according to claim 34-41 wherein treatment with PVME takes place for between 5 minutes and 16 hours.
43. A method according to claim 42 wherein treatment with a solution of PVME is
10 followed by a rinsing stage to remove unbound PVME.
44. A method according to any one of claims 28 to 43 wherein the polymeric material is treated with PVME by means of adding PVME to a membrane dope prior to casting.
45. A method according to claim 44 wherein the membrane dope is cast via a
15 thermally induced phase separation process.
46. A method according to claim 45 wherein the membrane dope includes PVME in an amount up to 1wt%.
47. A method according to claim 46 wherein the membrane dope is cast via a diffusion induced phase separation process.
- 20 48. A method according to claim 47 wherein the membrane dope includes PVME in an amount higher than 1wt%.
49. A method according to claim 47 or 48 wherein the PVME is dissolved in a polymer dope/solvent/non-solvent mixture.
50. A method according to claim 49 wherein the solvent/non-solvent mixture
25 includes a PVME solvent and PVME non-solvent.

51. A method according to claim 49 or 50 wherein the PVME solvent possesses weak polarity.
52. A method according to claim 51 wherein the PVME solvent is glyceroltriacetate.
53. A method according to claim 49 or 50 wherein the PVME non-solvent is strongly polar.
54. A method according to claim 52 wherein the PVME non-solvent is diethylene glycol, triethylene glycol, 1,4-butanediol or mixtures thereof.
55. A method according to any one of claims 49 to 53 wherein the solvent mixture includes from 40-60% non-solvent.
56. A method according to claim 49 wherein the solvent mixture includes PVME in an amount of 0.1-2wt%.
57. A method according to claim 56 wherein the solvent mixture includes PVME in an amount of 0.7-1wt%.
58. A method according to claim 45 wherein the method of casting is a TIPS process further including treatment with a coating solution.
59. A method according to claim 45 wherein the method of casting is a TIPS process further including treatment with a coating solution which contains a solvent and a non-solvent.
60. A method according to claim 46 wherein the process is a DIPS process where N-methylpyrrolidone is present as a solvent, and water is present as non-solvent.
61. A method according to claim 21 wherein PVME is incorporated in the membrane dope and formed into a membrane, and wherein said membrane is further treated with PVME.
62. A method according to any one of the preceding claims wherein the membrane is treated to cross-link incorporated and/or adsorbed PVME.

63. A method according to claims 62 wherein the method of cross linking is e-beam irradiation.

DATED this 5th Day of May 2005
Shelston IP

5 Attorneys for: U.S. FILTER WASTEWATER GROUP, INC.